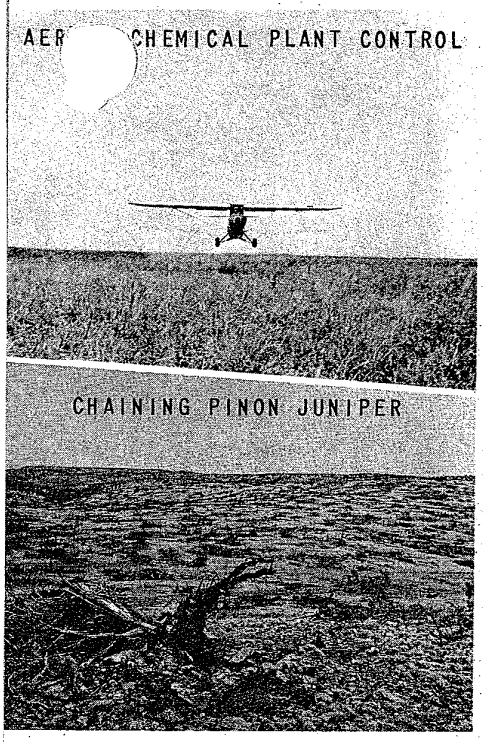
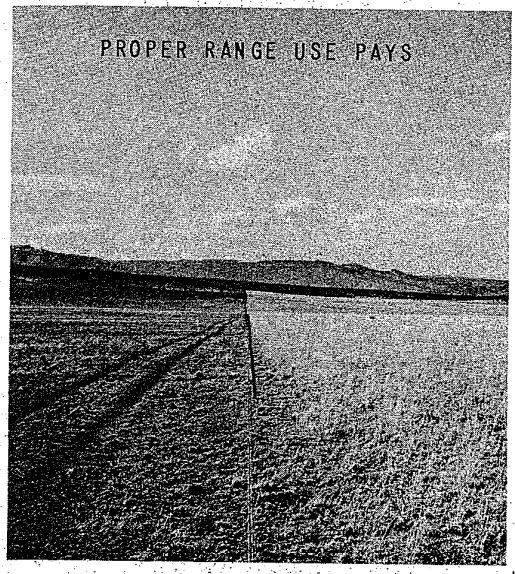
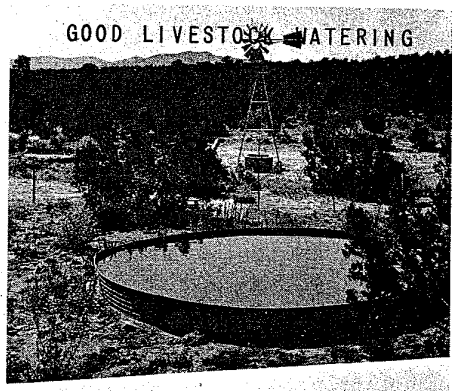
RANGE CONSERVATION - TECHNICAL NOTES







U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NEW MEXICO

RANGE TECHNICAL NOTE NO. 38

June 1, 1970

SUBJECT: RANGE - Practices - Proper Grazing Use

The National Handbook for Range and Related Grazing Lands, the Work Unit Technical Guides, and the Great Plains Conservation Program Handbook contain specific policy and procedure for planning and applying the Proper Grazing Use practice. The attached booklet entitled "Proper Grazing Use" was prepared by H. L. Leithead, Regional Range Conservationist, South Regional Technical Service Center, Fort Worth, Texas. It should be a very useful guide to supplement the established policy and procedures for this practice. This booklet will be particularly helpful in training new conservationists and in helping soil conservation technicians tool up to carry out certain duties included in their position descriptions. This booklet should be listed as a reference in Section I A of the technical guide.

Attachment

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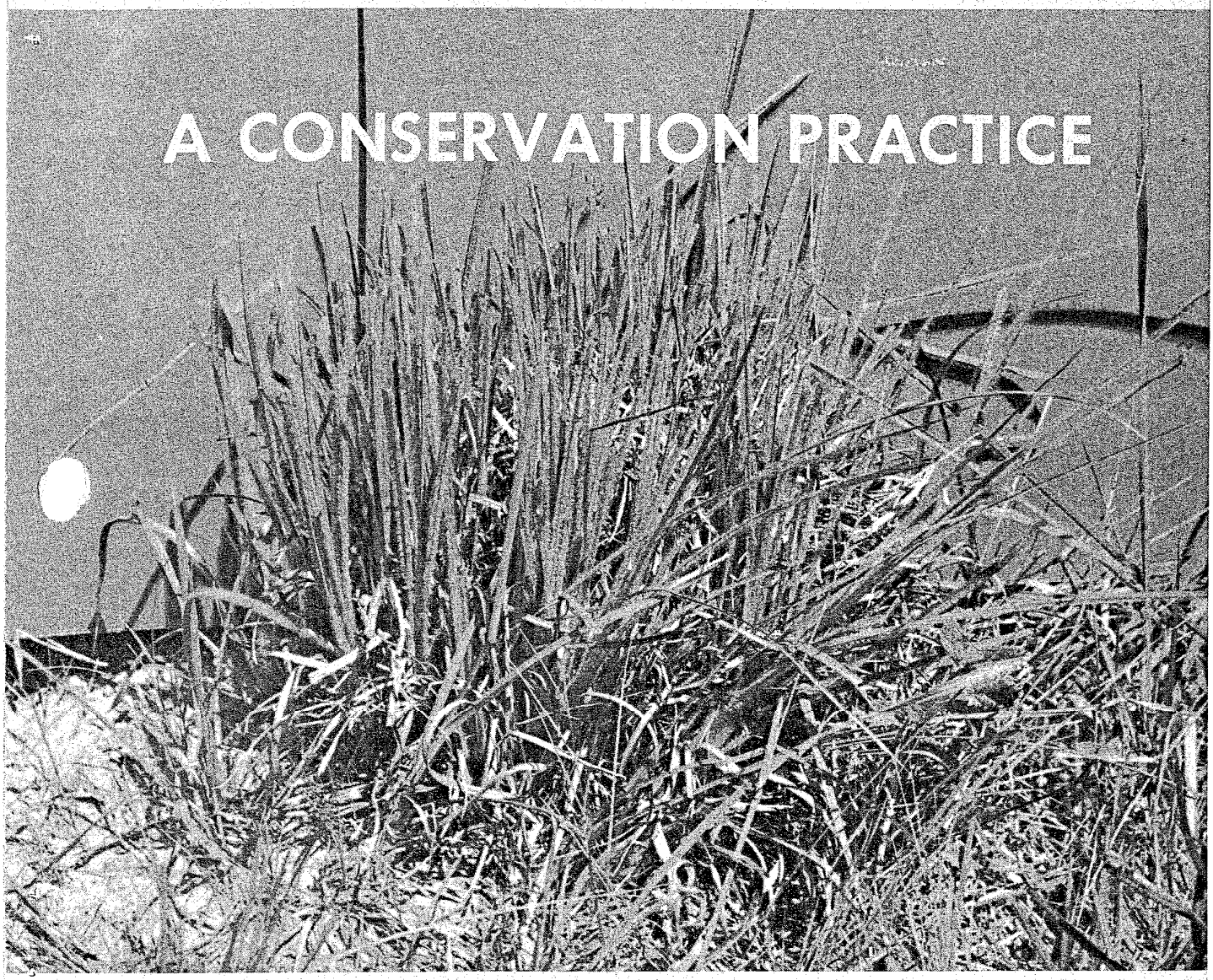
Proper Grazing Use



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U.S. Department of Agriculture
Soil Conservation Service
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1963

PROPER GRAZING USE - A CONSERVATION PRACTICE

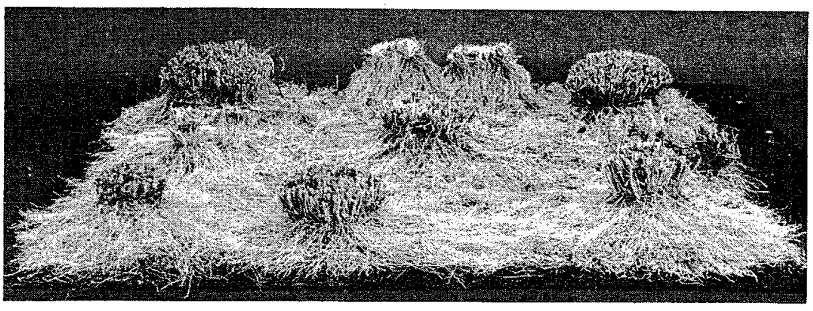
"Proper grazing use" of forage plants on rangeland and grazable woodlands can be defined as the control of grazing to limit the removal of the foliage of a plant, or plants, so that the root growth, forage production and the general health of the plant will not be adversely affected.

For all practical purposes, the Soil Conservation Service recognizes that when no more than 50 percent of the current year's growth, by weight, has been harvested from the key forage plants, the field or pasture has been properly used.

What is the importance of proper grazing use? What evidence do we have to support our recommendations for grazing limitations? How can we check compliance? The answers are given below.

A. The Importance of Proper Grazing Use

Proper grazing use is a conservation practice because it enables the grasses and forbs to maintain an adequate cover on the soil, occupy fully the root zone in the soil profile, increase water absorption in the soil and reduce runoff, maintain or improve the organic content of the soil -- a key to fertility. Proper grazing assures maximum returns from land devoted to grazing crops.



(Photo courtesy of Dr. J. E. Weaver)

Plot of little bluestem showing stem bases and roots in surface four inches of soil.

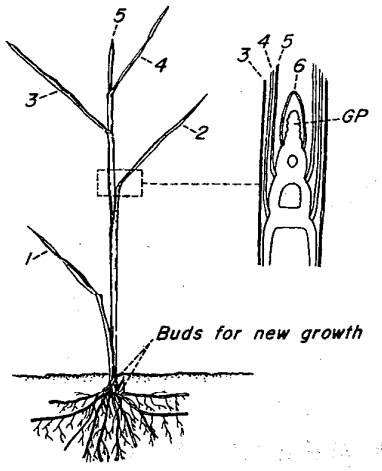
The litter and mulch that is left on the soil surface on a properly used pasture breaks up the force of rain. It makes millions of little dams. These dams retard the flow of water over the soil surface. The longer water is held on the soil surface the greater are its chances of being absorbed by the soil.

Adequate vegetative cover on grasslands is an important factor in flood control since it stores a maximum amount of water in the soil and slows runoff.

Proper use assures maximum forage production, and conversely, over-use will materially reduce the carrying capacity of the field.

B. How Over-Use Affects the Development of Top Growth and Roots

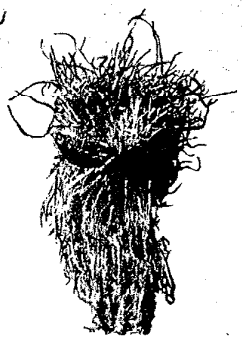
1. Growth points are keys to forage production. Leaves and stems are produced from growing points which are found near the ground in some plants, and several inches above the ground in other plants. When a plant is grazed or cut below that point there will be no more leaves produced by that stem.



This diagram of a grass plant and an enlarged cross-section show the general appearance and location of the growth point and leaves. The leaves and corresponding portions of the leaves on the enlarged insert are numbered for identification.

2. Good root growth is necessary for forage production. The roots gather raw materials and water from the soil and carry them to the plant. The green leaves turn them into plant food which sustains both the top growth and the root system. When too much top growth is removed, the food-producing process is curtailed and the plant draws on food stored in the roots while it produces new leaves. If the clipping, or grazing, is repeated frequently the plant continues to drain away the food stored in the roots and the root system shrinks. With a depleted root system the plant can produce only a minimum of top growth, and may die during drought or winter.

PAST USE - PROPER



PAST USE - HEAVY

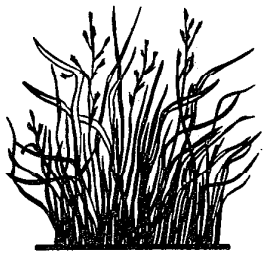
Here are two four-year-old grass plants which were planted at the same time, in the same field, on the same soil only a few feet apart. A fence divided the field. On one side of the fence the plants were grazed heavily during the two previous seasons. On the other side the grass was grazed properly for the same period.

The over-used plant has a small root system and poor top growth. The healthy plant has more roots, a larger crown, and more top growth.

3. Root growth is related to the amount of top growth removed. Research by Franklin J. Crider[1] focused attention to the relationship between the use of the above-ground portions of the plant and its root development. The percentage of grass roots that stop growing varied in proportion to the percentage of the foliage that was removed.

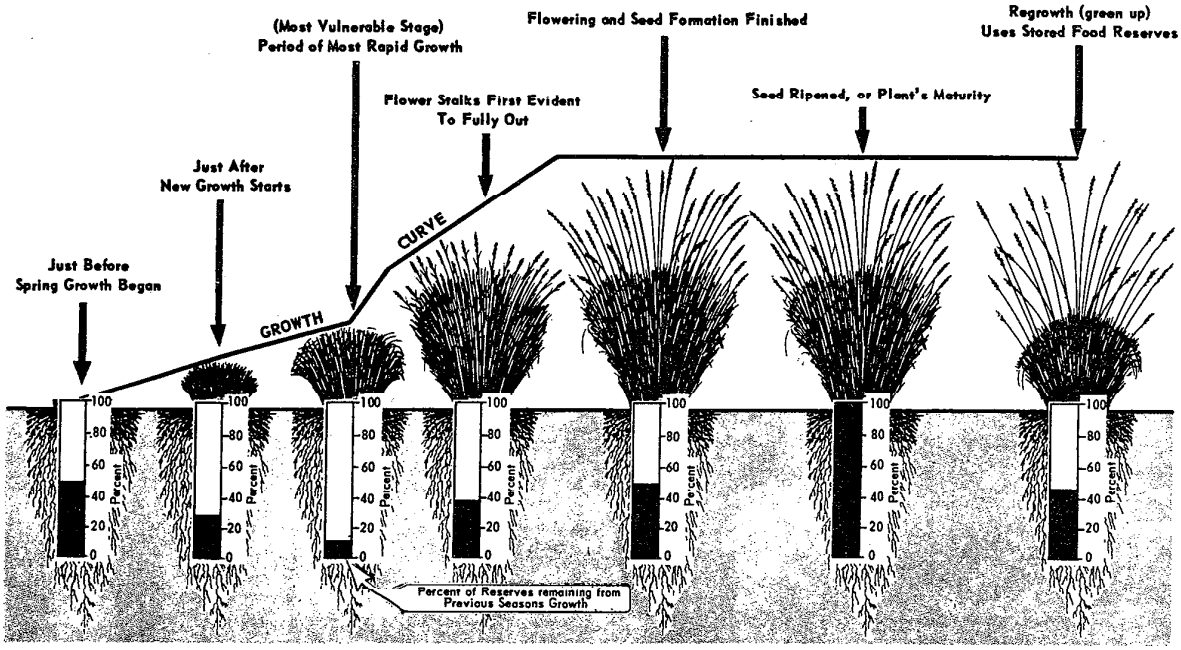
[1] USDA Technical Bulletin 1102, "Root Growth Stoppage Resulting from Defoliation of Grass", February 1955.

These drawings illustrate root growth stoppage after a single clipping.

Percentage of Top Growth Removed		Effect on Root Growth
	90 Percent	No Root Growth for 17 Days
	70 Percent	Approximately 48 Percent of the Roots Stopped Growing for 17 Days
	50 Percent	Approximately 3 Percent of the Roots Stopped Growing for 14 Days
	30 Percent	No Roots Stopped Growing

4. Food reserves must be maintained in root systems of grasses. As we have seen, the leaves manufacture plant food from raw materials. The roots, in addition to bringing raw materials to the green parts of the plant, are used for storage of food supplies. This food reserve is used to rebuild the top growth in the spring or after grazing or clipping. The following page shows how food reserves are used and then built up again.

FOOD RESERVES STORED in ROOTS and LOWER SEED STALKS of GRASS in relation to plant growth.



Perennial grasses draw upon stored food reserves:

(1) to start new growth in the spring.
(2) for regrowth after each harvest of foliage during the growing season.
(3) to sustain life during periods of dormancy.
(4) to prepare plants to resist heat and cold.

Food reserves must be maintained at a high level in the storage organs to keep plants vigorous and productive.

Systems of grazing and degree of use (grazing) are the keys to improving or maintaining productive pastures.

C. Summary

Briefly, here are the important reasons why grass plants must be kept healthy and strong if they are to produce maximum amounts of hay or pasture.

1. Continuous heavy grazing during the growing season or heavy grazing year after year during the period when the food reserves are lowest weakens grass plants. Weak plants are:

   a. less productive.
   b. damaged more by drought conditions.
   c. unable to withstand extremes in temperatures -- heat and cold.
   d. more susceptible to disease and insects.

2. Tall growing species that have most of their leaves high on the stem are almost totally dependent on stored foods for recovery after the plant has been grazed closely or cut for hay. Short growing species that have leaves near the soil surface are usually not totally defoliated by close grazing or cutting. They are not as dependent on stored foods for regrowth because the remaining leaves can produce food for regrowth.

3. The fall period is critical for plants as they prepare themselves to go into the winter season. The ability of plants to withstand exposure to freezing temperatures is dependent upon their ability to make most of the following metabolic changes.

   a. Decrease the total water and free water content in plant cells.
   b. Increase bound water content in the plant tissue.
   c. Convert starch to sugar.
   d. Slow down the active growth of the plant.

Plants start preparing themselves to go into the winter season as day length shortens, as average daily temperatures become lower, and as there is a greater fluctuation between day and night temperatures.

The plant's resistance to cold weather may be reduced when plants are grazed closely in late fall.

D. How to Tell When Forage Plants Have Been Properly Used

Three methods of judging proper grazing use are given below: Ocular estimate, stubble height, and clipping and weighing.

A practice such as proper use does not lend itself well to mechanical measurements as do structural practices. For this reason, methods had to be developed for our personnel to use in teaching cooperators to make their own proper-use check as well as make on-site checks for reporting purposes. The three methods described are acceptable and generally all three may be used to check proper grazing use on the same farm or ranch.

The first step, however, is to determine the key plants in each situation so that judgment will not be based on plants that are of minor value in the pasture.

1. Selecting the key species for determining proper use. Livestock are selective in their eating habits. Cattle and horses show a preference to grasses. Sheep and goats prefer more forbs and shrubs. There are also palatability differences between different species of grasses due to:

   a. forage maturity (cool season vs. warm season).
   b. leaf to stem ratio.
   c. previous grazing activities.

An unutilized plant or species cannot compensate for an over-used plant. Therefore, it is necessary to select a species for determining proper use, that is, the most palatable, productive and the one the operator wishes to maintain or have increase in composition.

Things to remember in selecting the key species are:

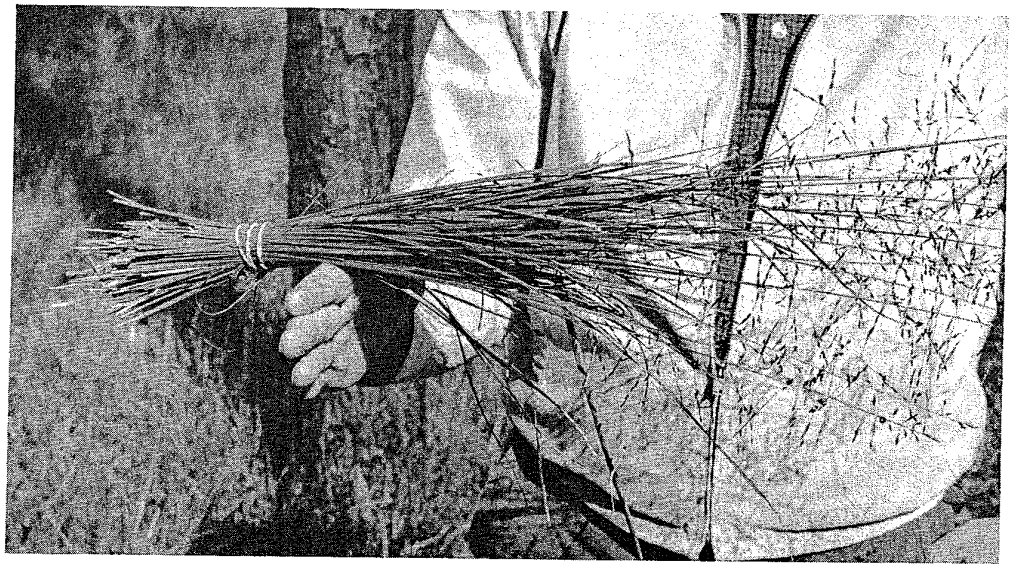
a. Class of livestock to be grazed
b. Season of use
c. Palatability
d. Abundance of species (The most palatable plant should make up about 20% or more of this composition.)

2. Ocular estimate (individual judgment). This system is based upon the judgment of the technician and may be used in cases where it is obvious that less than 50% of the forage of the key species has been harvested. This method should only be used after the judgment of the technician has been developed by the use of other methods.

3. Stubble height in judging volume removal. This method is fast and easy to teach to cooperators. It can be illustrated in one of two ways.

Cut an ungrazed plant at ground level. Tie it in a bundle with a string, rubber band or a few blades of grass. Balance the bundle of grass on your finger. This point represents 50%. Cut the bundle of grass in two at this point. Set the basal portion of the grass plant down beside an ungrazed plant of the same species. This gives a visual picture of what the average stubble height should be of grazed plants of this species in the pasture.

The pictures on the following page illustrate this method.

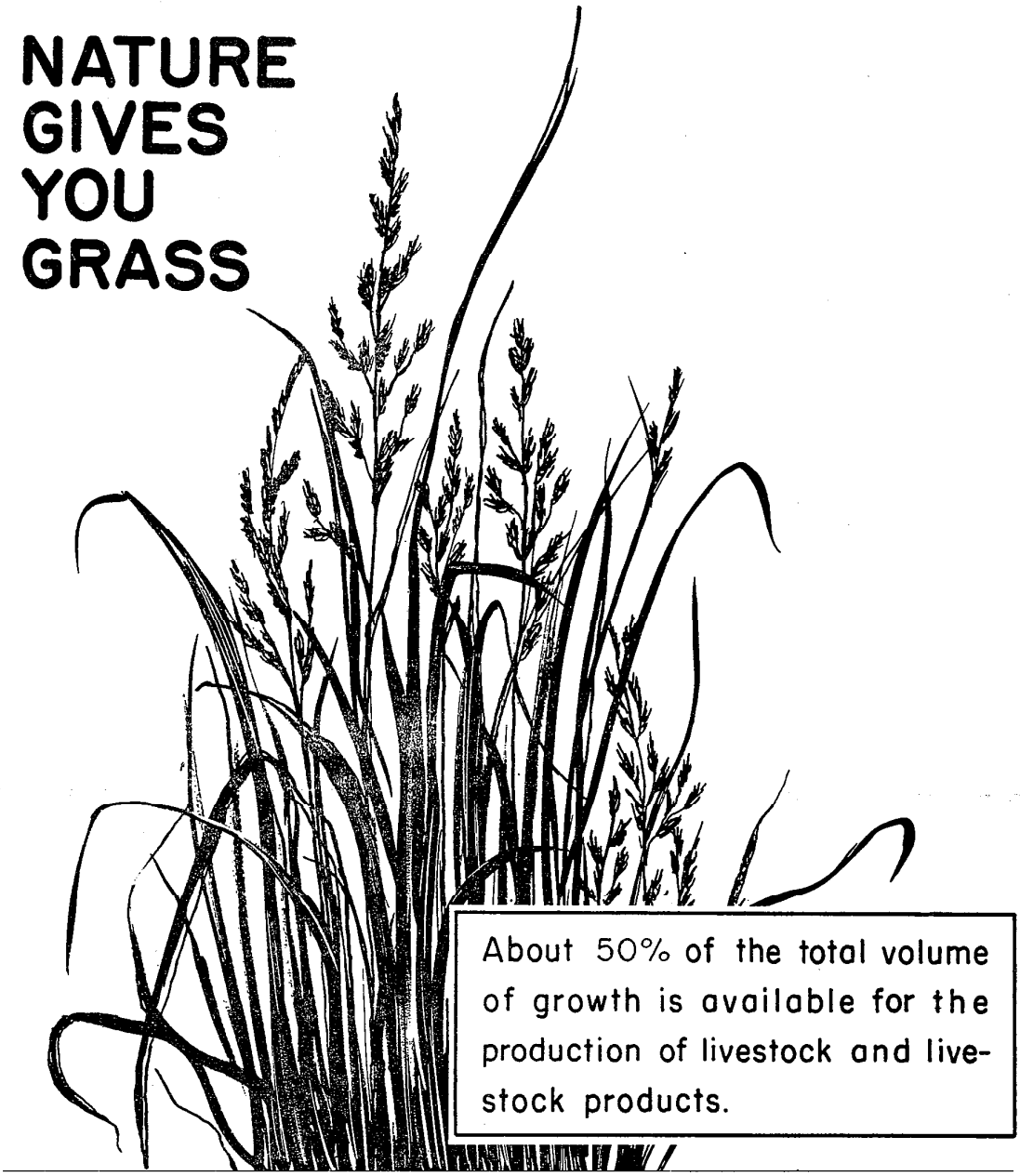


Grass plant balanced on finger to determine 50% by weight.

Basal portion of grass plant placed beside growing plant of same species to illustrate relation to stubble height.

The following four-page illustration can be used effectively in teaching cooperators the value of watching for signs of over-use of their better pasture plants.

NATURE GIVES YOU GRASS



About 50% of the total volume of growth is available for the production of livestock and livestock products.

The rest belongs to the land and the plant for ***GRASS INSURANCE*** .....

This insurance provides for:

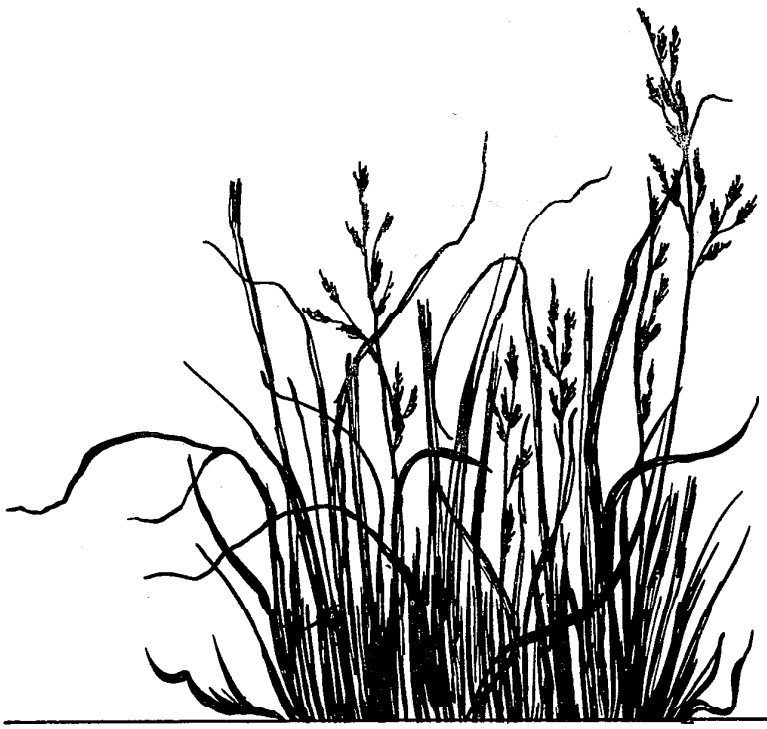
Erosion Control

Soil Fertility Maintenance

Water Conservation

Stabilized Soil Temperatures

Plant Development and Reproduction



Use beyond this point means

LOSS OF PLANT VIGOR

and Future Forage Production

Further use means

SUB-SOIL GRAZING.....

There is no further use, recovery is very slow and the erosion hazard is increased.

Nature does not give us something for nothing.

Reprinted from original USDA, SCS,
Fort Worth, Texas.

4. Clipping and weighing to determine volume removal. This method should be used by all technicians who check compliance of this practice. Trained, competent technicians may make ocular determinations based upon this method when backed up with experience and sound judgment. However, the experienced technician should check his judgment frequently and also go through the mechanics of this method when there is a question as to whether or not the application of the practice meets the specifications.

This method is based on the degree of use of key species and key areas. Individual species are to be sampled along a predetermined use zone to determine as accurately as possible the size and/or extent of the over-used area within a pasture or field.

a. Sampling plants. Take 25, 50 or 100 plants at random along a paced line transect. The size of the area to be sampled will determine to some extent the length of the paced transect. For example, you may wish to sample an average size plant of the species upon which proper use is being determined nearest to the right toe on every pace, every third, fifth or tenth pace.

Clip all plants to be sampled at ground level. Place the grazed plants in one bag and ungrazed plants in another. Record on the bag or in a notebook the number of plants placed in each bag.

When making use determination on sod forming species use six inch square plots instead of individual plants.

Example A: Ungrazed plants are encountered on line of samples.

G G G U G G U G G G G U U G G G G G U G G G G G G

The previous line of samples indicates that 25 plants, selected by a predetermined random method, were clipped. Twenty of these plants were grazed (any portion of the plant being grazed puts that plant, or plot, in this category) and forage from these was kept separate from the five ungrazed plants.

5 ungrazed plants weigh 24 grams

24 ÷ 5 = 4.8 grams (average weight per ungrazed plant)

4.8 x 25 (total plants sampled) = 120 grams (total weight of sample if none were used - 100% of forage left)

20 grazed plants weigh - - - - - - - - - - 42 grams
5 ungrazed plants weigh - - - - - - - - - 24 grams
Total weight of 25 plants sampled - - - - 66 grams

$$\frac{120 \text{ grams}}{100\%} = \frac{66 \text{ grams}}{x}$$

x = 55% (total forage left on ground)

If 55% is left, then the degree of use is 45%.

Example B:

G G G G G G G G G G G G G G G G G G G G G G G G G
U U U U

In this example, a sample of 25 plants was taken and no ungrazed plants were struck. A search was then made, near this line, and five ungrazed plants were located and clipped.

5 ungrazed plants weigh 26 grams

26 ÷ 5 = 5.2 grams (average weight per ungrazed plant)

5.2 x 25 (total plants struck on transect) = 130 grams (total weight of sample if none of plants were used - 100% of forage left.

25 plants sampled, all grazed, weigh 39 grams

$$\frac{130 \text{ grams}}{100\%} = \frac{39 \text{ grams}}{x}$$

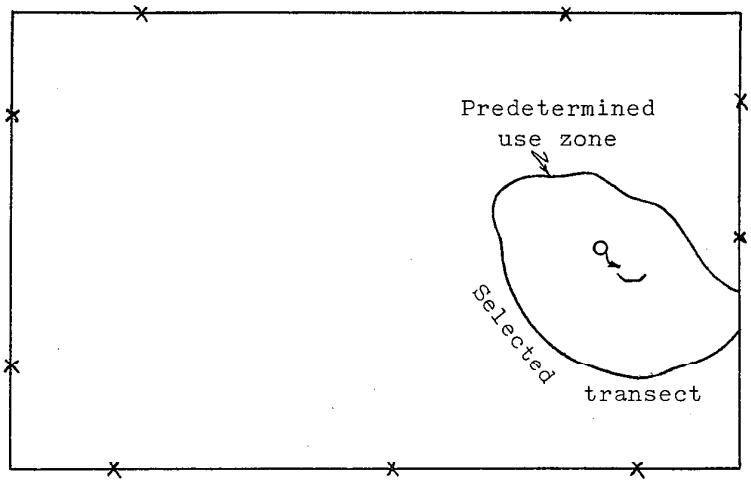
x = 30% (total forage left on ground)

If 30% is left, then the degree of use is 70%.

Code: U stands for ungrazed plants
G stands for grazed plants

b. Determining sample area. Livestock naturally graze pastures closer around waterings and other natural congregating places. The degree of use becomes lighter farther away from these areas. Therefore, if there is any over-used areas in a pasture it is adjacent to areas of concentration. The specifications say that such areas must not be greater than 10 percent of the acreage in the pasture. The object then is to locate these natural congregating places and determine the area of over-use adjacent to them.

Example:



Take one or more transects along this predetermined use zone. If the sample indicates that along this transect forage has been properly used and the area is less than 10% of the pastures, the pasture is properly used. If the sample indicates over-use along the transect, then it is necessary to move farther back and take another sample. Repeat this process until a reasonable accurate determination has been made as to the extent or size of the over-used area.

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